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a Uganda case study

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Impact of EU agricultural policy on developing countries: A Uganda case study

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Abstract

Despite substantial reforms, the EU's Common Agricultural Policy (CAP) is still criticised for its detrimental effects on developing countries. This paper provides updated evidence on the impact of the CAP on one developing country, Uganda. It goes beyond estimating macro-level economic effects by analysing the impacts on poverty. The policy simulation results show that eliminating EU agricultural support would have marginal but nonetheless positive impacts on the Ugandan economy and its poverty indicators. From the perspective of the EU's commitment to policy coherence for development, this supports the view that further reducing EU agricultural support would be positive for development.

Keywords: Uganda; Common Agricultural Policy; poverty; trade policy; domestic support; computable general equilibrium-microsimulation

JEL classification: D58; F14; O10; O55

1 Introduction

The European Union's (EU) Common Agricultural Policy (CAP) has long been criticised for its damaging effects on developing countries, and developing country agriculture in particular. The CAP has provided extensive support to EU farmers, through both higher prices and budget support. The resulting stimulus to production, and disincentives to consumption, meant that the EU emerged as a significant export competitor to developing country exporters, while its use of export subsidies enabled surpluses to be dumped at low prices on the markets of importing developing countries. Case studies undertaken by non-governmental organisations (NGOs) have highlighted the alleged impact of EU exports

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of particular commodities (milk powder, pig meat, poultry meat) in particular countries (APRODEV, 2007; Curtis, 2011; Fowler, 2002; Fritz, 2011; GermanWatch, 2008, 2009). At the same time, the EU's high level of border protection for many CAP commodities has prevented low-cost developing country exporters from selling to the EU market except under preferential access arrangements.

Model simulations confirm that the CAP has in the past distorted both the level and the volatility of world market prices to the detriment of farmers in developing countries (Adenäuer & Kuiper, 2009; Costa, Osborne, Zhang, Boulanger, & Jomini, 2009; Gohin, 2009; Gouel, Guillin, & P., 2008; Nowicki et al., 2009). However, the impacts on developing countries are very diverse. By encouraging agricultural production in the EU, the CAP hurts those developing countries that are net food exporters and that would, otherwise, supply a larger share of the EU or world market. But the situation is less clear for developing country exporters which have preferential access to the protected EU food market or which are net food importers. Defenders of the CAP point to Europe's openness to agricultural imports and underline that the EU is by far the largest importer of agricultural products from developing countries (CEC, 2012). Consumers and net importing developing countries could have reaped some benefits from lower world market prices (Panagariya, 2005); these countries, at least in the short run, are potential beneficiaries of protected EU agricultural markets. Thus, there will be winners and losers among developing countries from the operation of the CAP (Matthews, 2008).

During the past twenty years, the CAP has undergone significant reform. The 'new CAP' is a rather different animal to the traditional policy widely, and rightly, criticised by developing countries. According to OECD (2013), the Producer Support Estimate (PSE) for EU agriculture has fallen from 39% in 1986-88 to 19% in 2010-2012. More important is that the share of trade-distorting support in the total has fallen from 98% to around 50%. This is reflected in the decline in the Nominal Protection Coefficient for EU agriculture, which has fallen from 1.72 in 1986-88 to 1.04 in 2010-2012. Nonetheless, it remains the case that EU farmers are still heavily subsidised, and for some products high tariffs persist. While reforms have been in a liberalising and market-oriented direction during the past two decades, a reversal of this trend cannot be excluded, particularly if current high world market prices were to significantly collapse.

Policy coherence for development (PCD) means that the EU should take account of the objectives of development cooperation in all policies that it implements which are likely to affect developing countries, and that these policies should support development objectives where possible. The EU has adopted both a strong political and legal commitment to policy coherence for development (Carbone, 2008). Article 208 of the present EU Treaty defines the overall objective of European development cooperation as follows: *"The Union's development cooperation policy shall have as its primary objective the re-*

duction and, in the long term, the eradication of poverty. The Union shall take account of the objectives of development cooperation in the policies that it implements which are likely to affect developing countries."

In the EU's latest work programme on policy coherence, food security in developing countries is one of five topics chosen for particular emphasis (Engel, Lein, Seters, & Helden, 2013). The European Commission in 2009 revised the guidelines for its ex ante impact assessment process for policy proposals under development to include PCD-relevant assessment indicators, noting the estimated impact of the proposed policy on third countries in general, and particularly on its social, security and environmental impacts. In accordance with these guidelines, the impact assessment accompanying the Commission's legislative proposals for the recent CAP reform included a discussion of the impacts of the reform on developing countries. The assessment noted that "impacts should be assessed on a case by case basis, as the economic, social, cultural and demographic heterogeneity among and within developing countries, as well as the multitude of factors that affect food security policies and situations in the short-, medium- and long-term, make generalisations difficult. The assumption of direct price transmission mechanisms calls for a methodological approach that combines aggregate/national with household level data" (EC, 2011: 4).

This paper responds to this challenge by examining the impact of the CAP on Uganda. Uganda is one of the world's least developed countries ($547 GDP per capita, current US$ in 2012) and has a high, if declining, share of its population living in poverty. It is thus representative of countries that are intended to be the focus of EU development aid. Uganda has a heavy dependence on agriculture. The sector employed 66% (2009) of the labour force and accounted for 23% of total GDP in 2011.[1] Agri-food exports accounted for 64% of total exports in 2013.[2] In 2013, 29% of Ugandan exports were destined for the EU of which 76% were agri-food products. Exports to the EU are highly concentrated on a few products: coffee, fish, other live plants, cocoa and tobacco account for 87% of total exports to the EU. Most of Uganda's main food staples (plantains, beans and cassava) are not widely traded, and the EU CAP does not significantly affect its main agricultural exports nor does Uganda depend much on agri-food imports (11% of total imports). Imports from the EU consist mainly of chemicals and manufactures with a share of 5% of agri-food products. As an LDC, and having initialled the interim EU–East African Community (EAC) Economic Partnership Agreement (EPA), Uganda receives duty-free access for all of its exports to the EU. Moreover, its land-locked nature provides Uganda a certain amount of natural protection and thus limits the extent to which changes in world market

[1] Data retrieved from World Development Indicators, March 18, 2014, `http://databank.worldbank.org`.

[2] All trade-related data in this paragraph refers to the year 2013 and were retrieved from UN COMTRADE via WITS, May 21, 2014, `http://wits.worldbank.org`.

prices are transmitted to domestic prices. Given these policy and structural characteristics, we do not expect the CAP to have major impacts, either positive or negative, on the Ugandan economy. This, in itself, is a testable hypothesis. In addition, our methodology illustrates the steps involved, and the data required, if one wishes to investigate the impact of the CAP on a developing country not only in aggregate terms but also in terms of its poverty impacts.

Our objective in this paper is to examine the impact of EU agricultural policy by modelling the removal of trade and agricultural policy instruments supporting EU farmers and assessing the impact of the policy changes on prices and poverty in Uganda. We confine the study to traditional agricultural support instruments (tariffs, export subsidies, direct payments) while recognising that agricultural trade can also be influenced by non-tariff barriers such as health and safety standards, biofuel policies, environmental regulations and climate regulation policies. A number of studies have simulated the impact on world markets of eliminating CAP support instruments although, as we review below, these studies are of limited usefulness in identifying the impacts of developing countries. The main contributions of this study are to identify the specific impact of the CAP on Uganda (comparing a scenario with and without the CAP) and to link the aggregate effect to Ugandan household incomes and expenditure in order to estimate the impacts on poverty in that country based on a computable general equilibrium (CGE) model framework.[3]

The simulations confirm that, on balance, further unilateral CAP reform would have positive but very small overall effects on Uganda in terms of its GDP, poverty rates and food security. Tracking the effect of this policy change through world and domestic price changes gives a better understanding of how changes in EU agricultural policy affect households in a developing country. We finally reflect on the usefulness of this approach to measuring the impact of EU non-aid policies on developing countries as part of PCD.

The paper is structured as follows. Following this motivation of the research question, Section 2 briefly reviews previous literature on the impact of the CAP on developing countries. Section 3 briefly describes the two models and the databases used. Section 4 describes the scenarios, how the models are linked to derive the poverty impacts of the CAP and the results of our simulations. Section 5 concludes.

[3]This study uses a consistent series of external shocks generated by a specific simulation of CAP reform in contrast to our earlier study which made use of synthetic shocks derived from the literature (Boysen & Matthews, 2012). We are also able to decompose the impact of CAP reform into the elimination of border measures and the elimination of direct payments in this study.

2 Literature review and critique

There is an extensive literature on the ways in which the CAP impacts on developing countries, but much of this is qualitative in nature and there are relatively few empirical studies. Empirical studies fall into two groups. On the one hand, case studies have been undertaken, often by NGOs, examining the impact of EU exports of particular commodities (milk powder, pig meat, tomato paste) in particular countries (see references above). A problem in interpreting these studies is that they do not develop a clear counterfactual of what would happen in the absence of the CAP. Case studies generally start by examining the impact of EU trade flows (usually exports), although this is not the same as examining the impact of the CAP. Only if the EU would no longer export in the absence of the CAP might it be justified to equate the impact of EU exports in a developing country with the impact of the CAP. In some cases, the EU might indeed be a net exporter with the CAP but a net importer in its absence. In other cases, the EU might still be an exporter without the CAP, even if a smaller one. Even if the EU were to cease exports, it is possible that the local market would be supplied by exports from another country rather than from local production. Another criticism is that case studies usually focus on the impact of EU exports in importing countries. But EU agricultural protection may also adversely affect the interests of developing country exporters, either directly by restricting access to the EU market, or indirectly by competing with these exporters in third country markets. Again, the main problem in identifying these effects on exporters is establishing the counterfactual of what trade flows would occur in the absence of the CAP.

Modelling helps to address these two criticisms, but at the cost of introducing a new set of difficulties. In recent years, a wide array of simulation results has been published examining the impact of agricultural protection in OECD countries on developing countries (Anderson & Martin, 2005; Anderson, Martin, & Van Der Mensbrugghe, 2006; Brooks, 2014; McMillan, Zwane, & Ashraf, 2007; OECD, 2007). There is wide variation in the published empirical results. Partly, this variation reflects improvements that have taken place in the models and databases over time. In part, the variation reflects the inherent complexities in modelling the causal links between EU policies (and OECD policies more generally) and their impacts in a developing country as well as the impact of the assumptions that the modellers must make. However, relatively few studies publish the impacts of the CAP alone, simulated by a unilateral EU liberalisation of its agricultural policy. Of those published studies which do identify the impact of the CAP on world markets, many are now considerably dated and are no longer a reliable guide to CAP impacts. Three of the more relevant studies are briefly reviewed.

The Scenar 2020-II study (Nowicki et al., 2009) contrasted a 'Liberalisation' scenario with a 'Reference' scenario which carried forward the existing CAP orientation over the

period of the simulation. The 'Reference' scenario included a 20% reduction of the CAP budget in real terms (constant in nominal terms), the implementation of the Single Payment System (SPS) in all member states as of 2013, full decoupling, a 30% decrease in direct payments (DP) in nominal terms, a 105% increase of the European Agricultural Fund for Rural Development (EAFRD) and some trade liberalisation as a result of a Doha Round agreement. In the 'Liberalisation' scenario, all CAP trade-related measures are discontinued. The CAP budget is reduced by 75% in real terms, all direct payments and market instruments are removed, and there is a similar increase in EAFRD expenditure as in the 'Reference' scenario.[4] The 'Liberalisation' scenario also assumes full liberalisation of agricultural policy in other countries. This attenuates the effect of CAP liberalisation on EU agriculture, as does the limited amount of reform already foreseen in the 'Reference' scenario. The modelling work employed a CGE model (LEITAP) and partial equilibrium models (ESIM, CAPRI). According to the Scenar-II study CAP liberalisation would reduce the level of agricultural production in the EU with a greater impact on livestock products. The land and (to a lesser extent) segmented labour markets help to maintain production as they absorb the negative impact of liberalisation due to a decline in land prices and a lower growth rate of agricultural wages. These two factors contribute to keeping European agriculture competitive, along with the expected increase in productivity. Only very aggregated results are reported for the impacts on third countries, but there is a relatively higher growth in agricultural production in low-income countries (Central and South America, Africa and Asia) in the 'Liberalisation' scenario.

Costa et al. (2009) is a GTAP[5] application simulating the removal of all CAP instruments using version 7 of the GTAP database, which has a base year of 2004, although the simulation is run for the year 2007. According to the modelling results, the CAP leads to higher output of the farm and food processing sectors in the EU, by about 8% and 6%, respectively, but lower output in the EU manufacturing and services sectors. The additional farm and food output in the EU is estimated to depress world prices for these goods by between 1% and 4%, while world prices for manufactured goods and services increase. These price movements induce a contraction in agriculture and food processing in non-EU regions, and an expansion in the manufacturing and services sectors. In most regions outside the EU welfare is lower because of the CAP, and would increase with CAP liberalisation (East Asia is an exception).

[4]The Scenar-II study also examines the implications of a third scenario, labelled the 'Conservative CAP' scenario, in which Pillar 1 direct payments are increased relative to the 'Reference' scenario and Pillar 2 payments significantly reduced (by 45%) to maintain the overall CAP budget constant.

[5]GTAP refers to the Global Trade Analysis Project which regularly updates and publishes the GTAP Data Base, a fully documented, publicly available global data base which contains complete bilateral trade information, transport and protection linkages, and which has also developed a standard GTAP model (T. W. Hertel, 1997), a multi-region, multi-sector, CGE model, with perfect competition and constant returns to scale, which is widely used to model trade liberalization scenarios.

Gohin (2009) uses a CGE model of the EU-15 to determine the effect of the CAP on world prices. His model disaggregates the agri-food sector (32 primary agricultural commodities, 30 food commodities and 10 animal feedstuffs, with the rest of manufacturing and services included as two further sectors). The model is calibrated to a 2005 social accounting matrix for the EU-15. The simulations are conducted against a baseline in 2015 which takes account of the 2005 CAP Luxembourg reforms (decoupling of direct payments) but assumes no agreement on further WTO trade liberalisation. The simulation assumes the complete elimination of CAP and other agricultural policy instruments in 2015, including export subsidies, import tariffs, tariff rate quotas, the special safeguard mechanism, internal consumption subsidies, production quotas, direct payments and Pillar 2 payments. Direct payments are assumed partially coupled to production based on a literature survey of decoupling effects. Pillar 2 payments are modelled as direct subsidies to labour and capital. Gohin finds significant world market price effects from this simulation of the elimination of the CAP, particular on world beef, maize and bioethanol markets. His estimates of the world market price changes resulting from elimination of the CAP are much greater than those in the other studies reviewed.

We conclude that there is a relatively thin recent empirical literature which examines the effect of the CAP on world markets, and the studies reviewed come to very different results regarding this impact. We therefore undertake an updated analysis using more recent data and with a specific focus on identifying the impacts on Uganda.

3 Methodology

3.1 Model framework and database

3.1.1 Model framework

The model framework for the policy simulations consists of a sequence of two comparative-static CGE models. First, we use the GTAP model with version 8 of the database based on 2007 data to simulate the CAP changes in the EU and its impacts on prices and trade between the different regions of the world. Then, the resulting changes in Ugandan trade prices and quantities are passed to a detailed national model of Uganda as exogenous simulation shocks. Their impacts on both the overall economy as well as households are then assessed.

CAP-tailored GTAP model. The CAP reform in the EU and its world market impacts are simulated using a specially tailored CAP version of the multi-regional CGE model GTAP. The standard GTAP model (Hertel 1997) is extended with policy variables and

equations making it possible to distinguish specific CAP budgetary payments, both national or EU financed payments, within the model. Also the financing of the CAP is modelled as a homogenous percentage contribution of national GDP by individual member states to the EU budget, whereby the model captures net transfers of payment between EU countries. Given these additional variables and equations the specially tailored CAP GTAP model is run on a database where each EU member country is specified individually. The macroeconomic closure is neoclassical where investments are endogenous and adjust to accommodate any changes in savings. This approach is adopted at the global level, and investments are then allocated across regions so that all expected regional rates of return change by the same percentage. Although global investments and savings must be equal, this does not apply at the regional level, where the trade balance is endogenously determined as the difference between regional savings and regional investments. The quantities of endowments (capital, land, labour, and natural resources) in each region are fixed exogenously within the model. The Ugandan CPI is used as the numéraire for the model.

Uganda model. For the detailed analysis of the Ugandan impacts, we adopt the single-country IFPRI Standard Computable General Equilibrium Model in GAMS (Löfgren, Harris, & Robinson, 2002). This choice is motivated by its excellent documentation and public availability which increase the transparency and ease of discussing the model and the results. The reader is referred to the documentation in Löfgren et al. (2002) for an exhaustive description and mathematical formulation of the model. Only model adaptations and closure assumptions are presented here. To facilitate the microeconomic analysis of income distribution and poverty effects, the standard model is extended to incorporate the full set of household observations from the nationally representative Uganda National Household Survey (UNHS) 2005/06 as individual households into the CGE model, also called an "integrated CGE-microsimulation model".[6] Each household's livelihood is characterized by its individual pattern of expenditures and income sources. But households are differentiated further. As in the IFPRI standard model, the consumption behaviour of households follows the Linear Expenditure System (LES) functional form. However, consumption preferences differ for each household as its LES is individually parameterized by an own, idiosyncratic set of demand elasticities which is calculated from an econometrically estimated flexible demand system (see Boysen, 2012). On the income side, each household differs by the quantities of the various factors it owns but also by the extent to which each of its labour types is utilized. Its labour utilization adapts to wage

[6]For a detailed discussion on various approaches for analysing household-level impacts on the basis of CGE model extensions, see Bourguignon, da Silva, and Bussolo (2008), Boysen and Matthews (2008) or Bussolo and Cockburn (2010).

changes within the extremes of unemployment and full employment. The potential for additional labour supply (un- and underemployment) of individual households has been derived from the UNHS data on unemployment, inactivity, and time-related underemployment of households' members.[7]

In the standard model, commodities produced and sold on the domestic market are regarded as imperfect substitutes to imported commodities ("Armington assumption"). But as the CAP reform affects trade flows between Uganda and the EU differently than those between Uganda and other regions, it is important to further distinguish the external account according to origin and destination of trade. Thus, the regions EU, East African Community (EAC) and the rest of the world (ROW) are distinguished and imports from these regarded as imperfect substitutes. This is implemented in two levels. The higher-level Constant Elasticity of Substitution (CES) function aggregates imports from the EU, the EAC and the ROW together to a single imported commodity. The lower-level CES function combines imported and domestic goods into a final composite good which is sold on the domestic market. The elasticities of substitution between imports and domestically produced goods have been adopted from T. Hertel, Hummels, Ivanic, and Keeney (2007). The elasticities of substitution between imports from different origins are twice the value of the preceding ones.[8] To facilitate the link to the results of the global CGE model, as explained later, the constant elasticity of transformation (CET) export supply functions of the standard model are replaced by downward-sloping export demand functions, separately for each export destination.[9]

The choice of "closures" has been guided by the goal to keep them as closely aligned with those of the CAP GTAP model while introducing some country-specific detail into the factor markets. However, these closures allow effects on household welfare which cannot be measured in the model. This includes future welfare effects from saving, borrowing, and investment and non-monetary welfare provided through public goods and services. Changes in government consumption cause unaccounted welfare effects through changed provision of public goods and services. Likewise, changes in government savings imply unaccounted welfare effects in the future. In this model, the government reacts to changed revenue by adapting its spending on non-education, non-health services while keeping savings constant.[10] The exchange rate adapts so that foreign savings remain con-

[7] Adopting the definition from the report on the UNHS (UBoS, 2006), time-related underemployment refers to individuals from the workforce which have worked less than 40 hours per week and are willing and able to provide more labour hours. For the present study, the actual number of additional labour hours available is required.

[8] See T. Hertel et al. (2007) for a brief discussion of this "rule of two".

[9] Thereby giving up the small country assumption and the assumption that goods for the domestic and export markets are differentiated.

[10] The intention with this closure is to limit the effect of changes in government revenue on the provision of public goods with a direct effect on the welfare of poor households.

stant. Investment is determined by total savings which depends on the fixed savings rates of the households and the enterprise.

The way factor markets work has been modified compared to the standard IFPRI model. Our analysis looks at a long term horizon. Accordingly, capital can depreciate and be reinvested in other sectors and is thus assumed to be fully mobile at a fixed supply level with rents clearing the market. Wage rates vary to clear the labour markets. But also the supplies of unskilled and skilled labour are assumed to increase with the associated real wage levels based on the so-called *wage curve* relationship introduced by Blanchflower and Oswald (1995). They empirically found a relationship between the level of the real wage and unemployment with an elasticity of unemployment with respect to the real wage level of approximately -0.1 valid across a large number of countries. Subsequently, this relationship and elasticity have been empirically confirmed by numerous studies for various countries, including the African countries Burkina Faso, Côte d'Ivoire, and South Africa. Nijkamp and Poot (2005) subject the findings of the wage curve literature to a meta-analysis, confirm the stability of the negative real wage to unemployment relationship, and suggest a publication-bias corrected elasticity of -0.07. Here, an elasticity of -0.1 is adopted. While the wage curve is observed on a macro level and thus is implemented to affect the aggregate supplies of skilled and unskilled labour, respectively, individual households might be limited in their potential to increase (fully employed) or decrease (unemployed) their labour supply. Accordingly, the labour supply of each household is modelled as being restricted from below by the state of unemployment and from above by full employment. More specifically, the labour utilization rate adapts in terms of percentage point changes uniformly for all households but some households are unaffected if their individual labour utilization rates are already at a limit. UBoS (2006, Table 4.13) reports a time-related underemployment rate of 12.1% and an unemployment rate of 1.9%.

Also the land market is assumed to clear through rent adjustments. As climate and soil conditions vary strongly across Uganda, crops, trees, and pastures cannot be grown with the same productivity in all areas. To reflect these differences in productivity when reallocating land between different crop uses, an approach presented by Keeney and Hertel (2009) is adopted. According to this, each land owner has a fixed area of land and rents it out to different activities with the goal of maximizing returns from land subject to limitations on the transformation of land from one use to another. As this limits the mobility of land, rents differ between sectors. Here, the model formulation consists of a two-level CET function nesting structure. On level one, the land owner decides on renting to annual or permanent crops or pastures. On the second level, the owner decides on renting to a particular use within each group. The transformation of land use between the annual and permanent crop and pasture groups as well as within the permanent group is assumed to

be rather sluggish with an elasticity of transformation of -0.25. By contrast, switching land between uses for different annual crops is easier and an elasticity of transformation of -1.1 is assumed and a quasi-perfect elasticity of transformation between pastures for different livestock types of -20.

The CPI is fixed and serves as the numéraire for the model.

3.1.2 Data

GTAP database. The simulations of global impacts of the EU CAP reform employ a modified version of the standard GTAP version 8 database (Narayanan, Aguiar, & McDougall, 2012).

The GTAP database is a system of multi-sector economy-wide input/output tables (countries) linked at the sector level through trade flows between commodities used both for final consumption and intermediate use in production. The database version 8 employed in this analysis represents the global economy in the year 2007 and divides the global economy into 112 countries/regions where the present EU 27 member states are specified as individual countries. The database specifies 57 commodities where 12 are primary and 8 are secondary agricultural commodities. In this analysis, the GTAP database is aggregated to 28 regions with 25 EU member countries/regions specified together with Uganda, rest of EAC and the rest of the world (ROW).[11] On the commodity side, the database is aggregated in a way to best match the commodity representation used for the national Uganda model resulting in 32 commodities where the 12 primary agricultural plus the forestry and fishing commodities are maintained.[12]

The modifications to the standard GTAP database identify the CAP agricultural domestic support payments by country and sector and enable direct modelling of the corresponding policy changes. Specifically, the agricultural domestic support payments found in the standard GTAP database originate from the OECD's Producer Support Estimate (PSE) tables. These correspond to the EU's Pillar 1 decoupled payments to farmers and are reported by the EU as Green Box payments under the WTO Agreement on Agriculture. A condition for Green Box payments is that they should have no or minimal impact on trade. The literature, however, has brought forward evidence that the EU's direct payments are not fully decoupled from production but there is little evidence on the degree of such coupling (Urban, Jensen, & Brockmeier, 2014). This study adopts the assumption that direct payments are coupled to output to some degree and thus bias the production pattern. To modify the standard GTAP database, the PSE table for the EU year 2007 has

[11] The results for the individual 25 EU member countries/regions are aggregated to EU 27 results within the CAP-specific GTAP model providing results for the EU 27 which are transmitted to the Uganda model.

[12] The 8 secondary agricultural commodities are aggregated to 5, the 20 manufacturing commodities to 7 and the 15 services commodities to 6 commodities.

been disaggregated so that domestic support payments are allocated to individual member countries and calibrated into the model as input, output, and land-, capital-, labour-based subsidies (for details, see Urban et al., 2014).

In the CAP-tailored GTAP database used in our simulations, the standard calibration of the direct payments single farm payment into the GTAP database is maintained as it occurs in the standard GTAP database. This implies that the direct payments are allocated in the database as a generic homogenous input subsidy rate to land, labour and capital employed in the primary agricultural sectors. Given the initial distribution of factor incomes in the primary agricultural sectors found in the data, this means that roughly 85% of the direct payments removed in the CAP liberalization scenario are, to some degree, coupled to production. The remaining 15% are decoupled from production representing the average share of land rents found in the EU 27 countries. Given this calibration, the effects on Uganda resulting from our simulations of cuts of the EU direct payments are among the strongest effects we can suspect to happen if the CAP is liberalised. The calibration of the GTAP database could, however, be altered to reflect a lower degree of coupling (see Urban et al., 2014, for a discussion on the subject).

Details of the CAP protection by sector in the CAP-tailored GTAP 8 (2007) database are shown in Table 1. In 2007, the EU had two digit tariffs on processed meat, rice and

Table 1: EU border and direct payment support for primary and processed agricultural products, per cent

			Direct payments		
	Import tariff	Export subsidy	Land	Labour	Capital
Paddy rice	9	0	10	10	10
Wheat	6	0	14	15	15
Other cereal grains	3	0	13	14	14
Vegetables, fruit, nuts	6	1	13	13	13
Oil seeds	0	0	13	14	13
Sugar cane, sugar beet	0	0	14	14	14
Plant-based fibers	0	0	16	17	17
Other crops	1	0	13	13	13
Bovine cattle, sheep and goats, horses	3	3	18	17	14
Other animal products	2	0	14	14	14
Raw milk	0	0	15	15	15
Wool, silk-worm cocoons	0	0	15	15	14
Meat products	17	5	0	0	0
Processed rice	24	0	0	0	0
Sugar	75	98	0	0	0
Other food products	6	0	0	0	0
Beverages and tobacco products	6	0	0	0	0

Source: Own computations from the CAP-tailored GTAP 8 database. Direct payment subsidies as percentages of the respective factor input value.

sugar while processed sugar was the main receiver of export subsidies. Export refunds amounted to 1.4 billion euro in 2007 with 509 million euro spent on sugar and 513 million

euro on milk products (included in the meat sector). Direct aid in the EU amounted to 37 billion euro in 2007 with roughly 32 billion euro being accounted for by the single farm payment (SFP) and single area payment scheme (SAPS). The remainder of roughly 5 billion euro of direct aid mainly represents the remaining coupled payments still found in France, Spain and Greece in 2007. Henceforth, the term 'direct payments' is used to comprise the named three types. Table 1 shows that this is equivalent to an input subsidy rate of between 10% to 17% when aggregated up to EU averages by sector. The CAP reform scenario reduces these input subsidy rates to zero removing roughly 32 billion euro of support together with the 5 billion euro of other direct support still remaining in France, Spain and Greece (not shown in Table 1). In addition, all primary and processed agricultural import tariffs and export subsidies are reduced to zero.

Data for the Uganda model. The detailed national Uganda model builds on the data from the 2007 social accounting matrix (SAM) for Uganda constructed by Thurlow (2008) which is extended to include the complete set of households from the UNHS 2005/06. [13] The final, extended Uganda SAM comprises 21 agricultural and 29 non-agricultural sectors, unskilled and skilled labour, land, and capital as factors of production, as well as accounts for an enterprise, the government, household transfers, the rest of the world, and finally 7,421 households. The SAM data (based on the national accounts) and the household data (drawn from the household survey) are reconciled by a series of procedures.[14] The structure of the final SAM is summarized in Table 2. Additionally, import values and tariffs from the TRAINS database (UNCTAD, 2010) are used for disaggregating Ugandan imports and exports (see Table 3) by origin as well as for construction of the tariff scenarios.

3.2 Poverty lines and measures

For measuring poverty, we employ an absolute poverty line and the measures P_α introduced by Foster, Greer, and Thorbecke (1984). The measure is defined as $P_\alpha = \frac{1}{N} \cdot \sum_{i=1}^{N} \left(\frac{z-y_i}{z}\right)^\alpha \cdot I_i$ with N: population size, z: poverty line, y_i: income of individual i, and $I_i = 0$ if $y_i < z$ and $I_i = 1$ otherwise. Setting the parameter α to 0, 1, or 2 computes the poverty headcount, gap, or severity index, respectively. The poverty headcount index P_0 measures the percentage of people falling below the poverty line. The poverty gap P_1 measures what percentage of the poverty line the average poor person needs as additional income to reach the poverty line.

[13] Although a newer household survey is available for Uganda, the UNHS 2005/06 has been adopted as it also was the basis to construct the 2007 Uganda SAM.

[14] A technical appendix describing the reconciliation is available from the authors on request.

Table 2: The structure of Uganda's domestic industry and trade in 2007, per cent

	Share in total production value	Share in total value added	Share in total exports	Export share in output of the sector	Share in total imports	Import share in demand for commodity	Import tariff	Share in total import tariff revenue	Share in total household home consumption	Share in total household market consumption
Maize	1.2	1.7	1.9	18.6	0.8	13.3	0.1	0.0	2.4	0.2
Rice	0.3	0.4	–	–	–	–	–	–	–	–
Other cereals	1.0	1.4	1.7	22.8	1.9	33.8	0.3	0.0	2.7	0.4
Cassava	1.7	2.4	–	–	–	–	–	–	10.2	1.3
Irish potatoes	0.4	0.3	–	–	–	–	–	–	1.2	0.3
Sweet potatoes	1.9	2.5	–	–	–	–	–	–	12.3	0.8
Beans	2.2	2.6	4.3	27.1	–	–	–	–	7.3	1.8
Vegetables	0.6	0.9	0.0	0.5	–	–	–	–	2.6	2.0
Matooke	2.6	4.0	–	–	–	–	–	–	15.7	2.4
Fruits	0.7	1.0	0.1	4.2	0.1	4.4	7.9	0.0	3.8	0.9
Oil seed crops	0.7	0.9	0.2	3.3	0.1	4.5	0.1	0.0	1.8	1.0
Cotton	0.1	0.1	1.1	100.0	–	–	–	–	–	–
Tobacco	0.4	0.5	3.5	96.5	–	–	–	–	–	–
Coffee	0.8	0.8	7.4	100.0	–	–	–	–	–	–
Tea leaves	0.2	0.3	2.3	100.0	–	–	–	–	–	–
Other export crops	0.2	0.2	1.5	63.0	–	–	–	–	–	–
Cattle	1.3	1.6	–	–	–	–	–	–	–	–
Poultry	0.4	0.3	0.0	1.8	0.0	1.9	3.8	0.0	1.9	0.4
Other livestock	0.2	0.3	0.2	11.3	–	–	–	–	0.1	0.4
Total primary agriculture	16.8	22.2	24.2	16.4	2.9	5.2	0.4	0.1	62.1	12.0
Fish	1.4	2.1	5.4	37.0	–	–	–	–	0.2	1.3
Forestry	1.8	2.1	1.6	8.5	–	–	–	–	1.2	4.1
Grain milling	1.9	0.6	–	–	1.1	8.6	8.6	0.6	3.9	4.1
Meat processing	1.4	0.1	0.7	4.1	0.8	7.1	0.4	0.0	3.4	5.1
Fish processing	0.7	0.1	5.7	58.3	0.5	13.3	2.0	0.1	0.0	0.9
Other food processing	2.9	0.9	8.1	23.8	4.0	18.5	6.9	1.8	0.6	6.4
Animal feed processing	0.3	0.1	–	–	–	–	–	–	–	–
Beverages & tobacco	1.1	0.5	0.5	3.5	1.0	10.5	9.7	0.6	0.6	3.3
Total food processing	8.4	2.3	15.0	14.5	7.4	12.2	6.5	3.0	8.6	19.8
Manufacturing	6.3	4.0	9.5	11.5	66.6	45.9	22.9	96.9	0.1	18.2
Services	65.4	67.3	44.4	7.0	23.0	6.3	0.0	0.0	27.9	44.7
Total	100.0	100.0	100.0	10.6	100.0	15.6	15.7	100.0	100.0	100.0

Source: Own computations from the extended 2007 Uganda SAM.

Table 3: Distribution of imports to and exports from Uganda by region and sector, per cent

	Sector's share in total imports	Share in sector's imports			Sector's share in total exports	Share in sector's exports		
		EAC	ROW	EU		EAC	ROW	EU
Maize	0.79	2.6	15.1	82.3	1.87	96.3	0.0	3.7
Other cereals	1.88	5.7	7.6	86.7	1.66	74.8	0.0	25.2
Beans	–	–	–	–	4.30	57.9	12.3	29.9
Vegetables	–	–	–	–	0.04	13.0	60.4	26.6
Fruits	0.08	44.9	0.0	55.1	0.13	1.9	75.4	22.7
Oil seed crops	0.14	50.9	6.0	43.1	0.16	15.9	21.4	62.6
Cotton	–	–	–	–	1.09	13.1	0.0	86.9
Tobacco	–	–	–	–	3.52	23.1	40.1	36.8
Coffee	–	–	–	–	7.41	0.2	35.5	64.3
Tea leaves	–	–	–	–	2.28	99.5	0.2	0.3
Other export crops	–	–	–	–	1.51	0.5	44.9	54.5
Poultry	0.03	37.4	33.9	28.7	0.04	71.1	28.5	0.5
Other livestock	–	–	–	–	0.23	0.7	26.1	73.2
Forestry	–	–	–	–	1.56	19.9	56.4	23.7
Fish	–	–	–	–	5.43	0.5	89.2	10.4
Grain milling	1.06	11.4	8.0	80.6	–	–	–	–
Meat processing	0.79	35.4	25.3	39.3	0.68	52.7	13.0	34.3
Fish processing	0.55	6.1	12.2	81.7	5.67	1.7	36.5	61.8
Other food processing	4.02	18.2	6.5	75.3	8.12	20.0	19.2	60.8
Beverages & tobacco	1.00	75.3	7.6	17.1	0.49	18.0	0.9	81.1
Manufacturing	66.64	20.4	24.2	55.4	9.46	20.6	17.4	62.0
Services	23.04	–	–	–	44.36	–	–	–
Total or weighted average	100.00	20.4	22.2	57.4	100.0	23.9	29.8	46.3

Source: Own computation from the 2007 Uganda SAM. As no data is available on the regional distribution of services imports and exports, the corresponding averages exclude services.

Rural and urban poverty lines are derived such that they reproduce the poverty headcounts reported in the UNHS Report on the Socio-Economic Survey (UBoS, 2006, Table 6.3.2 (a)) when applied to the adjusted household survey data. The UBoS poverty lines are based on the *cost of basic needs approach*, which accounts for the cost of meeting physical calorie needs and allows for vital non-food expenditure, such as clothing and cooking fuels, valued using the average consumption basket of the poorest 50% of the population (UBoS, 2006, Section 6.3). The rural and urban poverty lines account for the differences in prices and consumption baskets of the respective subpopulations. Per capita consumption is used as the welfare measure. To facilitate the poverty analysis from the CGE-MS results, household consumption is measured as the sum of the values of market consumption and home consumption of own produce, both valued at market prices, which then is deflated by the household-specific CPI. It should be noted that our poverty classification is not directly comparable with the classification in the official report of the UBoS (2006) due to differences in data adjustments.

4 Simulation scenarios and results

4.1 Scenarios

The basic scenario (*CAP*) modelled in this paper is the elimination of CAP protection to EU agriculture. This is measured as removing all import tariffs and export subsidies on agri-food products and all Pillar 1 direct payments to farmers in the model base year which is 2007. Milk and sugar quotas are implicitly in place in the database, but are not removed in the simulation, with the result that the impact of eliminating the CAP on these markets may be over-estimated (high sugar and dairy tariffs and export subsidies are removed which is expected to lower EU production of these products, but we do not allow for an offsetting increase in production due to the removal of quotas). Pillar 2 payments to farmers are kept in place as these are not viewed as providing protection and income support but rather as responding to market failures or providing regional assistance, such as agri-environment payments or payments to farmers in areas of natural constraints.

The respective contributions of the two main sets of instruments of the CAP to the total effect of the CAP scenario are disentangled by first simulating these in isolation before looking at the full CAP reform scenario. The scenario *Border* eliminates only border measures (import tariffs and export subsidies) and keeps total EU budgetary payments constant. The scenario *Direct Payments* (DP) only abolishes the direct payment measures.

Uganda scenarios. As the 2007 Uganda SAM is based on 2003 supply and use tables, it does not well reflect the current import tariff structure which changed substantially when Uganda formed the East African Community (EAC) customs union together with Burundi, Kenya, Rwanda, and Tanzania and correspondingly adopted the EAC's common external tariff (CET). To update Uganda's tariff structure to the CET, a first scenario (*2009*) simulates the implementation of the EAC CET by adopting the tariff changes observed between 2003 and 2009 according to the UNCTAD TRAINS database (UNCTAD, 2010). These results are not of interest by themselves for this study and thus are not shown but they serve as a synthetic baseline for the following simulations.[15]

The three scenarios for the simulations with the national Uganda CGE model are given through the changes in import prices and export prices and quantities between Uganda and the three regions EAC, ROW, and EU as determined by the results from the GTAP model simulations. To apply these results as external shocks to the Uganda CGE model, we adopt an approach suggested by Horridge and Zhai (2005). In order to align the trade behaviour of the single country model with that of the GTAP model, exports are determined by downward-sloping export demand functions with elasticities corresponding to the import

[15]The more detailed results not reported in this paper are available from the authors on request.

substitution elasticities of the GTAP model.[16] For the policy simulations, the locations of the export demand functions are shifted by changing the corresponding location parameter FP calculated from the GTAP simulation results for export prices and quantities together with the elasticities.[17] As for the import side, these authors argue that the consistency is sufficiently established by applying the import price change for the respective country from the global model results as import price changes to the single country model.

To illustrate the interpretation of the shocks to the location parameter assume a negative percentage change in the location parameter of the demand function for exports from Uganda. This implies that the curve gets steeper (more L-shaped) and shifts towards the origin. Thus, ceteris paribus, the export price and the quantity exported of this product decrease.

4.2 Results

For each scenario, we first explain the global effects from the GTAP model which cause the specific trade price and quantity changes that are applied as exogenous shocks to the national Uganda model and then continue with the Uganda model results. Note, only aggregate totals are shown for the non-food manufacturing and the services sectors, respectively, to reduce the size of the Uganda model-related tables. Moreover, economic values are given in real terms unless stated otherwise.

According to economic intuition, the removal of each of the three CAP policy measures (import tariffs, export subsidies, and direct payments) leads to increasing world market prices in the agri-food sectors affected. In addition, the reallocation of factors in the EU towards more efficient sectors reduces prices in the non-food manufacturing and services sectors as well as in the sectors which initially received less CAP support.

The effect on non-EU countries arises from both the direct changes in their trade with the EU and the changes in their terms of trade as implied by the changes in world market prices. The direction of the change in the terms of trade of each country depends on the composition of its import and export trade. In addition, if the EU cuts tariffs on imports from some particular country more than those from another country then the relative competitiveness of the latter country on the EU market and hence the quantity of imports from that country will be reduced. Such preference erosion concerns, in particular, developing countries which already have quota- and duty-free access to the EU for their imports. The EU can be expected to improve its welfare from the removal of distortions and result-

[16] Export demand functions are of the form $QE = \left(\frac{FP}{PWE}\right)^{ESUBM}$ with FP: location parameter, PWE: the domestic price of exports and $ESUBM$: the GTAP Armington elasticity.

[17] The shock for FP is calculated $\Delta FP = \frac{FP_1}{FP_0} = \left(\frac{QE_1}{QE_0}\right)^{\frac{1}{ESUBM}} \cdot \frac{PE_1}{PE_0}$ where QE_0, QE_1: the export quantities and PE: the corresponding export prices from the results of the respective GTAP model scenario simulations.

ing more efficient allocation of resources. For other countries, however, the direction of welfare effects is ambiguous *ex ante*.

4.2.1 Border scenario

Global results. The border scenario has two elements: the removal of the EU's tariffs on agri-food imports from, and the EU's subsidies on agri-food exports to, non-EU countries. Together, both elements lead to gains in the EU's GDP of 0.04% in total. Lowering the EU's agri-food border protection drives down domestic food prices through cheaper imports and exports and stimulates domestic demand. With lower prices, EU agri-food production decreases – while manufacturing and services expand – and EU demand increases resulting in excess demand on the ROW market and hence rising prices in the ROW. This shortage also causes trade prices between the ROW and Uganda to rise. As in the ROW resources are drawn into the agri-food sectors, factor costs and in consequence also prices in the non agri-food sectors increase there. However, as imports to the EU from different origins are regarded as imperfect substitutes (due to the Armington assumption) and agri-food imports from Uganda are now relatively more expensive compared to those from other countries for which import tariffs are now removed, the EU demand for agri-food imports from Uganda decreases (the EU demand curve for exports from Uganda shifts to the left). In general, EU export prices to Uganda tend to fall as a consequence of lower EU domestic prices. This is counter-balanced in the meat processing and other food processing sectors (which includes sugar) where the removal of previously high EU export subsidies means that Ugandan prices for EU imports increase for these products. Imports from the EAC to Uganda also become cheaper because the removal of EU import tariffs shifts trade from exporters with preferential trade arrangements, such as the EAC, to other exporters; thus EU demand for EAC agri-food products and, consequently, prices decrease as well. The resulting trade shock applied to the Uganda model is shown in Table 4.

Uganda results. The removal of EU agri-food tariffs has no direct impact on Ugandan trade which, in 2007, already had duty and quota free access to the EU market on basis of the Cotonou Agreement and the Everything but Arms scheme.[18] Nevertheless, Ugandan trade is affected indirectly because the EU's import tariffs against third countries are dropped. This leads to a loss of preferences vis-à-vis other exporters to the EU (preference erosion) and hence to a decrease in EU demand for Ugandan exports. Other

[18]The EU introduced the Everything but Arms scheme as a special arrangement under its Generalised System of Preferences in 2001. It provides duty-free and quota-free access to all least developed countries for all export commodities except arms. Duty-free access was delayed for bananas until January 2006, for sugar until July 2009 and for rice until September 2009 so trade barriers on these products from Uganda remain in the GTAP database.

Table 4: Border scenario: percentage changes to Ugandan export demand function location parameters and import prices

	Export demand location parameter			Import price			
Uganda model sector	EAC	ROW	EU	EAC	ROW	EU	GTAP sectors mapped
Maize	-0.07	0.76	-2.32	-0.10	0.67	-1.10	Grains
Other cereals	-0.06	0.73	-2.23	-0.02	0.65	-1.12	Wheat; grains
Beans	0.10	0.76	-2.51	–	–	–	Vegetables, fruit, nuts
Vegetables	0.10	0.76	-2.51	–	–	–	Vegetables, fruit, nuts
Fruits	0.10	0.78	-2.53	-0.06	0.75	-1.13	Vegetables, fruit, nuts; sugar cane, sugar beet
Oil seed crops	-0.01	1.13	-1.76	-0.07	0.89	-1.31	Oil seeds
Cotton	0.33	0.50	0.27	–	–	–	Plant-based fibers
Tobacco	-0.08	0.56	-1.00	–	–	–	Other crops
Coffee	-0.08	0.56	-1.00	–	–	–	Other crops
Tea leaves	-0.08	0.56	-1.00	–	–	–	Other crops
Other export crops	-0.08	0.56	-1.00	–	–	–	Other crops
Poultry	0.22	0.64	-2.51	-0.09	0.75	-1.64	Animal products nec
Other livestock	0.22	0.64	-2.51	–	–	–	Animal products nec
Forestry	0.05	0.17	0.08	–	–	–	Forestry
Fish	-0.06	0.38	-1.49	–	–	–	Fishing
Grain milling	–	–	–	0.00	0.43	-0.52	Processed rice; other food products
Meat processing	0.24	0.95	-3.26	0.00	0.65	1.16	Raw milk; meat
Fish processing	0.04	0.33	-1.69	0.01	0.40	-0.52	Other food products
Other food processing	0.05	0.51	-1.67	-0.02	0.53	0.56	Sugar; other food products
Beverages & tobacco	-0.04	0.12	-0.82	0.01	0.32	-0.32	Beverages and tobacco products
Textiles & clothing	0.20	0.23	0.07	0.05	0.30	-0.08	Wool and silk; textiles, apparel, leather
Wood & paper products	0.10	0.18	-0.01	0.02	0.25	-0.01	Wood and paper products
Mining	0.19	0.17	0.19	0.15	0.17	0.15	Mining
Fuels	–	–	–	0.16	0.18	0.13	Petroleum, coal products
Chemicals & fertilizer	0.11	0.16	0.05	0.04	0.25	-0.05	Chemical, rubber, plastic products
Other manufacturing	0.12	0.17	0.06	0.05	0.24	-0.03	Other manufacturing
Machinery & equipment	0.12	0.18	0.07	0.06	0.24	-0.01	Machinery and equipment
Furniture	0.12	0.17	0.06	0.05	0.24	-0.03	Other manufacturing
Utilities	0.06	0.17	0.01	–	–	–	Utilities
Hotels & catering	0.02	0.19	-0.05	–	–	–	Trade
Transport services	0.09	0.18	0.09	0.04	0.25	-0.02	Transport
Communication services	0.02	0.15	-0.01	-0.01	0.26	-0.13	Communication
Financial & banking services	0.03	0.16	0.06	-0.02	0.26	-0.05	Banking and insurance
Other private services	0.07	0.16	-0.02	-0.00	0.27	-0.11	Other services

Source: Own computation from GTAP Border scenario results.

exporters faced tariffs of up to 9% for primary agricultural products and up to 75% for processed food. At the same time, the import tariff abolition reduces EU internal prices for these products increasing EU demand and correspondingly prices on the world market. The removal of EU export subsidies, in contrast, affects Ugandan imports from the EU (mainly the fruits, meat processing and other food processing sectors) directly by increasing their prices.

The overall outcome is a matter of empirical analysis. Table 5 shows that the elimination of CAP border measures will lead to a deterioration in Uganda's terms of trade. In quantity terms, imports decrease by 0.13% while exports increase by 0.05%. The detailed results (not provided) show imports in all sectors but poultry declining. The picture on the export side is mixed. Exports from the majority of agri-food sectors including fish decline by 6% or less with the most notable exceptions being oil seed crops, cotton and processed meat exports which rise by 1% to 2% (see Table 6). Exports from the important manufacturing and services sectors, amounting to 9% and 44% of total exports, rise by 1.3% and 0.3%, respectively. GDP decreases marginally (-0.02%). Output increases marginally in aggregate and there is a slight shift in production towards those expanding export sectors. Private consumption decreases by 0.06% distributed across all sectors. The government reduces spending marginally to compensate for lower revenue. The real incomes of the poor tend to decrease in similar magnitude for rural and urban households as shown in Table 7. This scenario causes an increase of 0.01 percentage point in the national poverty headcount equivalent to 2,720 additional people falling into poverty. Equally, the poverty gap increase by 0.01 points. Figure 1 illustrates that the overall effect of this scenario is a slight increase in the poverty headcount and gap irrespective of the choice of the poverty line.

4.2.2 Direct payments (DP) scenario

Global results. EU GDP increases by 0.02%. Within the EU, the reduction in direct payments (even if only partially coupled to production) increases production costs and raises prices of the agricultural sectors and their upstream processing industries. The quantity demanded is lower at higher prices causing EU agri-food markets to rebalance in a new equilibrium with higher prices and lower quantities. This creates shortages and increases prices on world markets. Moreover, reduced agri-food production stimulates production in the non agri-food sectors where market prices tend to fall. Hence, EU demand for imports increases in the agri-food and decreases in the non agri-food sectors; likewise, prices for exports from the EU tend to increase in the agri-food and to decrease in other sectors. In contrast to the border scenario, the DP scenario causes similar shocks to both the EAC and the ROW. Both regions increase their demand for agricultural commodities

Table 5: Macroeconomic results

	Base	Border	DP	CAP
GDP components (real)	% of GDP	% change from Base		
Private consumption	76.96	-0.06	0.20	0.15
Investments	20.78	-0.06	0.26	0.21
Government consumption	11.80	-0.01	0.02	0.00
Total absorption	109.77	-0.06	0.19	0.14
Exports	15.59	0.05	-0.40	-0.36
Imports	-25.37	-0.13	0.40	0.29
GDP at market prices	100.00	-0.02	0.05	0.03
Net indirect taxes	9.13	-0.12	0.37	0.26
GDP at factor cost	91.09	-0.00	0.01	0.00
Government revenue	Share in total	% change from Base		
ROW transfers	43.01	0.02	-0.06	-0.04
Direct taxes	23.73	-0.08	0.16	0.09
Import taxes	11.09	-0.26	0.25	-0.02
Sales taxes	22.16	-0.02	0.05	0.03
Factor income distribution	Share in total	point change from Base share		
Labor unskilled	38.62	-0.00	-0.02	-0.02
Labor skilled	12.89	-0.00	-0.00	-0.01
Land	8.53	0.01	0.06	0.07
Capital	39.96	-0.00	-0.04	-0.05
Closure variables		change from Base		
Terms of trade (%)		-0.03	0.06	0.03
Real exchange rate (%)		0.04	-0.09	-0.05
Nominal exchange rate (%, UGX/USD)		0.02	-0.06	-0.04
Government spending on administration (%)		-0.01	0.03	0.01

Source: Own computation from CGE simulation results.

Table 6: Border scenario results: Percentage changes from Base

	Quantity				
	Output	Exports	Imports	Household consumption	Consumer prices
Maize	0.03	0.03	-0.42	-0.07	0.03
Rice	-0.02	–	–	–	–
Other cereals	0.16	0.45	-0.36	-0.18	0.16
Cassava	-0.02	–	–	-0.02	-0.04
Irish potatoes	-0.02	–	–	-0.03	-0.04
Sweet potatoes	-0.02	–	–	-0.02	-0.05
Beans	0.02	0.17	–	-0.03	-0.03
Vegetables	-0.03	-4.38	–	-0.02	-0.04
Matooke	-0.01	–	–	-0.02	-0.06
Fruits	-0.09	-5.94	-0.52	-0.03	-0.03
Oil seed crops	0.06	2.08	-0.67	-0.04	-0.02
Cotton	1.51	1.51	–	–	–
Tobacco	-0.40	-0.42	–	–	–
Coffee	0.11	0.11	–	–	–
Tea leaves	-0.03	-0.03	–	–	–
Other export crops	-0.25	-0.40	–	–	–
Cattle	0.08	–	–	–	–
Poultry	-0.03	-1.27	0.35	-0.04	-0.04
Other livestock	-0.03	-0.25	–	-0.02	-0.06
Total primary agriculture	0.01	0.04	-0.39	-0.03	-0.03
Fish	-1.32	-2.97	–	-0.01	-0.07
Forestry	-0.00	0.56	–	-0.08	0.00
Grain milling	-0.02	–	-0.39	-0.09	0.03
Meat processing	0.09	1.03	-1.24	-0.08	0.01
Fish processing	-0.73	-1.33	-0.34	-0.06	0.00
Other food processing	0.08	0.07	-0.51	-0.13	0.09
Animal feed processing	0.02	–	–	–	–
Beverages & tobacco	-0.02	0.26	-0.07	-0.06	-0.00
Total food processing	-0.03	-0.43	-0.50	-0.09	0.03
Manufacturing	0.35	1.29	-0.11	-0.15	0.06
Services	0.01	0.30	-0.03	-0.03	-0.04
Total	0.01	0.05	-0.13	-0.08	0.00

Source: Own computation from CGE simulation results. Household consumption is valued at market prices.

Table 7: FGT poverty indices and consumer price indices for the poor

	Base	Border	DP	CAP
National				
Headcount	30.01	0.01	-0.09	-0.06
Gap	8.85	0.01	-0.03	-0.02
Rural				
Headcount	33.25	0.01	-0.09	-0.07
Gap	9.84	0.01	-0.03	-0.02
Urban				
Headcount	12.68	0.02	-0.08	0.00
Gap	3.57	0.01	-0.01	-0.01
Poor only-CPI	100.00	-0.01	0.11	0.11

Source: Own computation from CGE simulation results. The columns show point changes in the indices from the Base column. The poverty figures use rural and urban poverty lines, respectively.

from Uganda but decrease it for processed foods and manufacturing and services. Ugandan imports from these regions become more expensive in case of primary agricultural products and cheaper for others. These results are reflected in the trade shock applied to the Uganda model, see Table 8.

Uganda results. A large share of Ugandan imports is manufactured goods and a large share of its exports is agri-food products (neglecting services exports which are mainly tourism-related), so that the terms of trade improve by 0.06%. Correspondingly, production shifts towards exported agri-food products where output increases the most in the cash crop sectors (by 3% to 6% for tobacco, other export crops, tea and coffee, see Table 9). The strong expansion in those agri-food sectors tends to increase consumer prices for other products through higher prices for primary factors and inputs. By contrast, the price for manufactures drops by 0.3% and its output by 1.2%. Overall, output drops by 0.03%. Uganda's primary agriculture expands but food manufacturing declines; exports become more concentrated on primary commodities and the import dependence for non-food manufactures and services increases. In aggregate, exports decrease by 0.4%, imports increase by 0.4%, GDP at market prices increases by 0.05% and household and government consumption as well as investments increase by 0.2%, 0.02% and 0.26%, respectively.

GDP at factor prices increases marginally (0.01%) and the factor income distribution shifts marginally from capital, and less from unskilled labour, to land (Table 5) allowing consumption to increase. But for the average poor household, the CPI actually increases because the prices for primary agricultural and food processing commodities increase.

Table 8: Direct payments scenario: percentage changes to Ugandan export demand function location parameters and import prices

	Export demand location parameter			Import price			
Uganda model sector	EAC	ROW	EU	EAC	ROW	EU	GTAP sectors mapped
Maize	0.68	0.26	5.28	0.54	-0.15	6.18	Grains
Other cereals	0.67	0.30	5.10	0.40	0.01	6.23	Wheat; grains
Beans	0.89	0.42	4.38	–	–	–	Vegetables, fruit, nuts
Vegetables	0.89	0.42	4.38	–	–	–	Vegetables, fruit, nuts
Fruits	0.89	0.42	4.35	0.27	0.03	8.28	Vegetables, fruit, nuts; sugar cane, sugar beet
Oil seed crops	0.76	0.30	3.54	0.40	0.07	4.99	Oil seeds
Cotton	0.09	0.10	2.19	–	–	–	Plant-based fibers
Tobacco	1.54	0.89	3.21	–	–	–	Other crops
Coffee	1.54	0.89	3.21	–	–	–	Other crops
Tea leaves	1.54	0.89	3.21	–	–	–	Other crops
Other export crops	1.54	0.89	3.21	–	–	–	Other crops
Poultry	0.64	0.66	4.14	0.70	-0.08	2.83	Animal products nec
Other livestock	0.64	0.66	4.14	–	–	–	Animal products nec
Forestry	-0.17	-0.73	-0.77	–	–	–	Forestry
Fish	-0.06	-0.62	-1.12	–	–	–	Fishing
Grain milling	–	–	–	0.03	-0.46	0.37	Processed rice; other food products
Meat processing	-0.02	-0.06	2.10	-0.02	-0.41	1.72	Raw milk; meat
Fish processing	-0.01	-0.33	0.05	0.00	-0.50	0.36	Other food products
Other food processing	-0.01	-0.35	0.06	0.09	-0.47	0.36	Sugar; other food products
Beverages & tobacco	-0.04	-0.39	-0.25	-0.08	-0.59	-0.06	Beverages and tobacco products
Textiles & clothing	-0.41	-0.62	-0.68	-0.16	-0.64	-0.83	Wool and silk; textiles, apparel, leather
Wood & paper products	-0.47	-0.69	-0.85	-0.15	-0.70	-0.82	Wood and paper products
Mining	-0.79	-0.76	-0.76	-0.72	-0.76	-0.77	Mining
Fuels	–	–	–	-0.70	-0.75	-0.79	Petroleum, coal products
Chemicals & fertilizer	-0.57	-0.71	-0.81	-0.20	-0.70	-0.85	Chemical, rubber, plastic products
Other manufacturing	-0.60	-0.72	-0.81	-0.29	-0.71	-0.87	Other manufacturing
Machinery & equipment	-0.71	-0.73	-0.80	-0.35	-0.71	-0.86	Machinery and equipment
Furniture	-0.60	-0.72	-0.81	-0.29	-0.71	-0.87	Other manufacturing
Utilities	-0.50	-0.74	-0.84	–	–	–	Utilities
Hotels & catering	-0.37	-0.71	-0.75	–	–	–	Trade
Transport services	-0.56	-0.75	-0.78	-0.23	-0.71	-0.87	Transport
Communication services	-0.53	-0.76	-0.85	-0.07	-0.71	-0.93	Communication
Financial & banking services	-0.41	-0.76	-0.83	0.03	-0.70	-0.96	Banking and insurance
Other private services	-0.57	-0.75	-0.86	-0.01	-0.70	-0.94	Other services

Source: Own computation from GTAP Direct payments scenario results.

Table 9: Direct payments scenario results: Percentage changes from Base

	Quantity				
	Output	Exports	Imports	Household consumption	Consumer prices
Maize	0.08	0.69	-0.35	-0.08	0.37
Rice	-0.09	–	–	–	–
Other cereals	0.03	0.68	-0.25	-0.04	0.31
Cassava	-0.04	–	–	-0.04	0.31
Irish potatoes	0.07	–	–	0.02	0.18
Sweet potatoes	-0.01	–	–	-0.03	0.26
Beans	0.47	2.63	–	-0.11	0.41
Vegetables	0.08	10.55	–	0.06	0.11
Matooke	-0.02	–	–	-0.05	0.25
Fruits	0.19	12.25	0.21	0.01	0.20
Oil seed crops	-0.03	3.63	-0.37	-0.06	0.31
Cotton	-0.38	-0.38	–	–	–
Tobacco	6.08	6.29	–	–	–
Coffee	2.56	2.56	–	–	–
Tea leaves	2.62	2.62	–	–	–
Other export crops	5.11	7.68	–	–	–
Cattle	0.02	–	–	–	–
Poultry	0.15	3.81	-1.00	0.03	0.16
Other livestock	0.51	3.62	–	0.11	0.14
Total primary agriculture	0.44	3.14	-0.28	-0.01	0.23
Fish	-1.33	-3.03	–	0.10	0.10
Forestry	-0.20	-3.66	–	0.18	0.04
Grain milling	-0.09	–	0.81	0.05	0.16
Meat processing	0.11	0.57	0.08	0.09	0.12
Fish processing	-0.81	-1.23	0.51	0.22	-0.01
Other food processing	-0.43	-1.35	0.45	0.18	-0.01
Animal feed processing	0.09	–	–	–	–
Beverages & tobacco	0.05	-0.89	0.25	0.18	-0.01
Total food processing	-0.22	-1.19	0.43	0.13	0.06
Manufacturing	-1.19	-4.94	0.54	0.59	-0.31
Services	0.03	-0.61	0.05	0.18	0.03
Total	-0.03	-0.40	0.40	0.25	-0.01

Source: Own computation from CGE simulation results. Household consumption is valued at market prices.

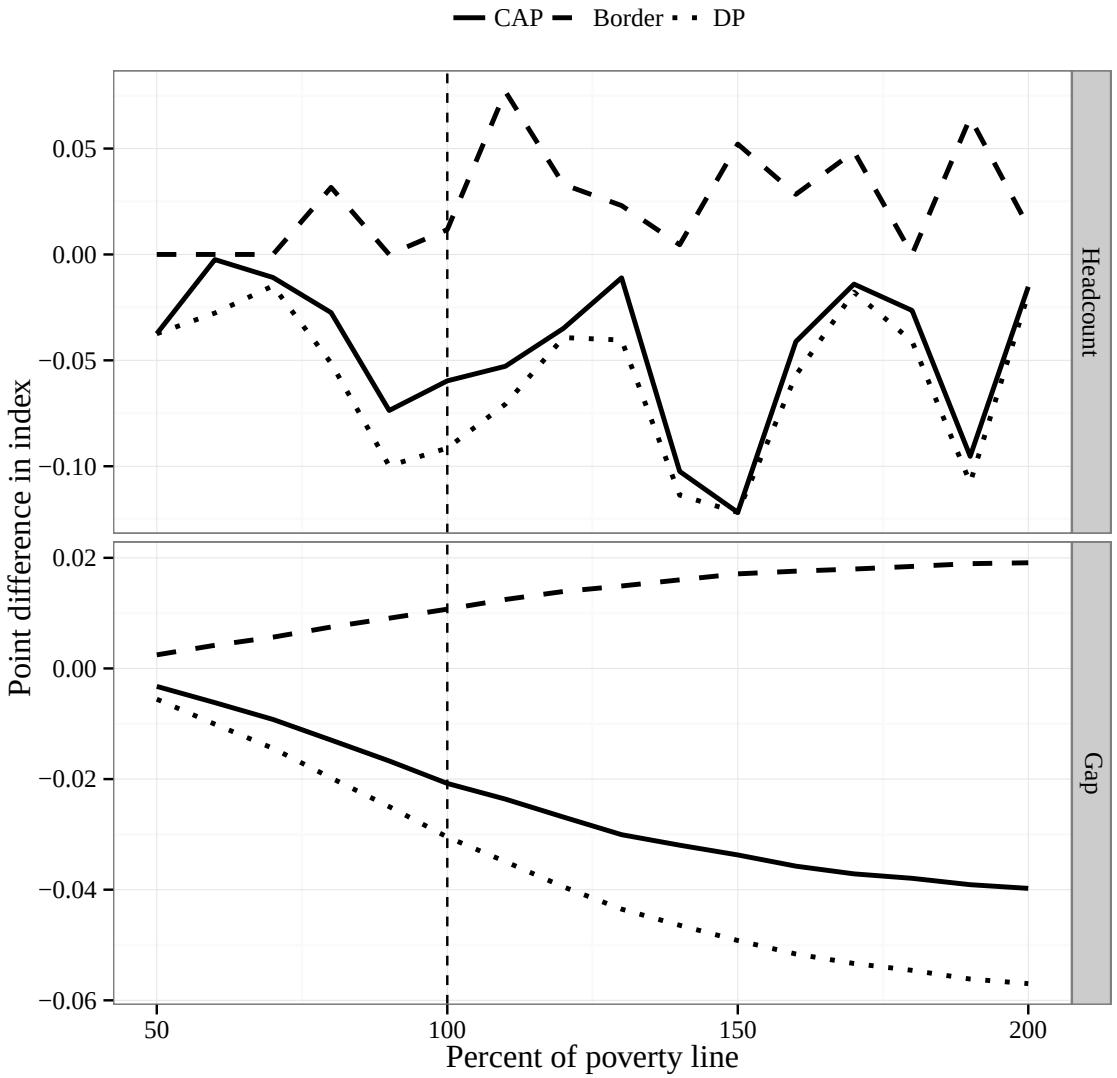

Figure 1: Sensitivity of FGT poverty indices to the choice of the poverty line

Nevertheless, the overall effect is a decrease in the poverty headcount by 0.09 points equivalent to a reduction of 24,480 poor people. The gap to the poverty line for the average poor person narrows by 0.03 points. In terms of the FGT poverty indices, the rural poor benefit slightly more than the urban. Considering a range of alternative poverty lines (Figure 1), the EU's removal of direct payments tends to have a slight poverty alleviating effect, even when other poverty lines are considered.

4.2.3 CAP scenario

Global results. The CAP scenario combines the previous two policy changes, i.e., the removal of border measures and of direct payments, simultaneously. This causes EU GDP to increase by 0.05%. The directions of change of demand for Ugandan exports and of the prices for imports from these regions to Uganda are ambiguous in cases where the two

policy changes work in opposite directions. In the simulation results, the EU increases demand for Ugandan agricultural and decreases that for other exports, see Table 10. From the EU, agricultural commodities become more expensive in Uganda, processed food prices tend to remain stable and other products become cheaper. The directions of effects on trade between Uganda and the ROW and the EAC are the same except for demand for Ugandan processed foods which increases.

Uganda results. For Uganda, the total effect is an increase in the terms of trade of 0.03% and a negligible increase in GDP of 0.03%. Exports decrease by 0.4% and imports increase by 0.3%. Total output decreases by 0.02% and there is a broad shift in production towards agricultural export sectors which expand by 3.3% on average (Table 11). Other sectors largely shrink including manufacturing (-0.9%) and fish and processed fish (-2.7% and -1.6%). Household consumption increases by 0.2% due to the factor returns distribution shifting mainly from capital to land. How this affects individual poor households depends on the changes in the returns to the factors they own and their individual consumption preferences. The CPI specifically calculated for the population below the poverty line increases reflecting that prices for almost all agri-food products increase. The CAP abolition decreases the national poverty headcount by 0.06 points equivalent to lifting 16,320 out of poverty. The decrease in the poverty gap by 0.02 points indicates a general but minor income gain for people living below the poverty line. Figure 1 highlights that the impact on the headcount varies quite strongly with different poverty lines but both headcount and gap reduce irrespectively of the line chosen. Thus, CAP elimination could have a slightly poverty alleviating effect in Uganda. Rural households turn out to benefit more than urban ones as the headcount remains unchanged for the latter.

5 Review and conclusions

The EU's CAP has long been criticised for its incoherence with the EU's development policy objectives, the primary and overarching objective of which is the eradication of poverty in the context of sustainable development (CEC, 2005). But, over time, the CAP has been reformed slowly in a more market-oriented direction and developing countries have become more heterogeneous. This has led the European Commission to conclude: "With the mostly criticised negative effects largely addressed over the previous consecutive reforms through a decoupling of payments and a gradual elimination of export refunds, the implications of the current CAP reform for development are limited. The CAP has become more market oriented, thereby considerably reducing its potential negative impacts on world markets. Therefore past criticisms about the negative effects on global food security are no longer relevant" (CEC, 2013, p. 106).

Table 10: CAP removal scenario: percentage changes to Ugandan export demand function location parameters and import prices

	Export function location parameter			Import price			
Uganda model sector	EAC	ROW	EU	EAC	ROW	EU	GTAP sectors mapped
Maize	0.63	1.09	2.99	0.44	0.57	5.15	Grains
Other cereals	0.64	1.11	2.90	0.39	0.73	5.18	Wheat; grains
Beans	1.02	1.27	1.88	–	–	–	Vegetables, fruit, nuts
Vegetables	1.02	1.27	1.88	–	–	–	Vegetables, fruit, nuts
Fruits	1.02	1.28	1.83	0.20	0.85	7.54	Vegetables, fruit, nuts; sugar cane, sugar beet
Oil seed crops	0.76	1.53	1.93	0.34	1.04	3.79	Oil seeds
Cotton	0.46	0.67	2.58	–	–	–	Plant-based fibers
Tobacco	1.54	1.59	2.35	–	–	–	Other crops
Coffee	1.54	1.59	2.35	–	–	–	Other crops
Tea leaves	1.54	1.59	2.35	–	–	–	Other crops
Other export crops	1.54	1.59	2.35	–	–	–	Other crops
Poultry	0.90	1.38	1.60	0.62	0.73	1.20	Animal products nec
Other livestock	0.90	1.38	1.60	–	–	–	Animal products nec
Forestry	-0.11	-0.54	-0.72	–	–	–	Forestry
Fish	-0.13	-0.25	-2.68	–	–	–	Fishing
Grain milling	–	–	–	0.03	-0.02	-0.15	Processed rice; other food products
Meat processing	0.23	0.90	-1.49	-0.03	0.27	2.96	Raw milk; meat
Fish processing	0.04	0.02	-1.69	0.01	-0.09	-0.16	Other food products
Other food processing	0.04	0.18	-1.67	0.06	0.07	0.93	Sugar; other food products
Beverages & tobacco	-0.10	-0.26	-1.10	-0.08	-0.28	-0.40	Beverages and tobacco products
Textiles & clothing	-0.21	-0.39	-0.64	-0.12	-0.34	-0.94	Wool and silk; textiles, apparel, leather
Wood & paper products	-0.38	-0.51	-0.90	-0.14	-0.47	-0.87	Wood and paper products
Mining	-0.63	-0.62	-0.59	-0.60	-0.61	-0.64	Mining
Fuels	–	–	–	-0.57	-0.59	-0.68	Petroleum, coal products
Chemicals & fertilizer	-0.46	-0.55	-0.80	-0.17	-0.47	-0.93	Chemical, rubber, plastic products
Other manufacturing	-0.48	-0.56	-0.78	-0.26	-0.49	-0.93	Other manufacturing
Machinery & equipment	-0.59	-0.55	-0.77	-0.31	-0.49	-0.90	Machinery and equipment
Furniture	-0.48	-0.56	-0.78	-0.26	-0.49	-0.93	Other manufacturing
Utilities	-0.46	-0.58	-0.86	–	–	–	Utilities
Hotels & catering	-0.36	-0.51	-0.83	–	–	–	Trade
Transport services	-0.48	-0.58	-0.72	-0.20	-0.48	-0.92	Transport
Communication services	-0.52	-0.61	-0.90	-0.09	-0.46	-1.10	Communication
Financial & banking services	-0.39	-0.60	-0.81	-0.00	-0.45	-1.05	Banking and insurance
Other private services	-0.51	-0.58	-0.92	-0.02	-0.44	-1.09	Other services

Source: Own computation from GTAP CAP scenario results.

Table 11: CAP removal scenario results: Percentage changes from Base

	Quantity				
	Output	Exports	Imports	Household consumption	Consumer prices
Maize	0.12	0.73	-0.86	-0.15	0.43
Rice	-0.12	–	–	–	–
Other cereals	0.21	1.17	-0.68	-0.24	0.50
Cassava	-0.06	–	–	-0.06	0.28
Irish potatoes	0.05	–	–	-0.00	0.14
Sweet potatoes	-0.03	–	–	-0.05	0.22
Beans	0.48	2.78	–	-0.13	0.39
Vegetables	0.05	5.64	–	0.04	0.07
Matooke	-0.03	–	–	-0.07	0.21
Fruits	0.09	5.63	-0.34	-0.02	0.17
Oil seed crops	0.03	5.89	-1.14	-0.10	0.30
Cotton	1.28	1.28	–	–	–
Tobacco	5.94	6.15	–	–	–
Coffee	2.80	2.80	–	–	–
Tea leaves	2.73	2.73	–	–	–
Other export crops	5.09	7.62	–	–	–
Cattle	0.08	–	–	–	–
Poultry	0.11	2.45	-0.75	-0.00	0.13
Other livestock	0.48	3.39	–	0.09	0.09
Total primary agriculture	0.47	3.30	-0.75	-0.04	0.20
Fish	-2.71	-6.11	–	0.10	0.04
Forestry	-0.22	-3.19	–	0.11	0.05
Grain milling	-0.12	–	0.43	-0.04	0.21
Meat processing	0.18	0.88	-1.16	0.02	0.13
Fish processing	-1.57	-2.62	0.16	0.16	-0.00
Other food processing	-0.37	-1.33	-0.06	0.06	0.08
Animal feed processing	0.10	–	–	–	–
Beverages & tobacco	0.03	-0.67	0.19	0.13	-0.01
Total food processing	-0.26	-1.71	-0.07	0.05	0.10
Manufacturing	-0.86	-3.67	0.45	0.46	-0.25
Services	0.03	-0.34	0.03	0.16	-0.01
Total	-0.02	-0.36	0.29	0.18	-0.01

Source: Own computation from CGE simulation results. Household consumption is valued at base market prices and consumer prices are weighted by base quantities.

While we broadly agree with this assessment the CAP retains a number of protectionist features which potentially can impact on third countries (Matthews, 2014). The impact of the CAP on developing countries is an empirical question; this impact will differ depending on the economic, trade and poverty characteristics of each country. In this paper, we investigate the impact of the CAP on Uganda. Uganda is an appropriate country for analysis as a least developed country with a high dependence on agriculture and a high share of agri-food exports in total exports. It also benefits from unrestricted access (subject to rules of origin) to the EU market for agri-food products under preferential trade agreements. While we do not expect to find large impacts from further reform of the CAP, the approach we have adopted facilitates the identification of the transmission channels between CAP reform and its household and poverty impacts in Uganda.

Our empirical results in simulating the removal of remaining border protection and direct payments to EU farmers suggest, indeed, that the impact on Uganda will be marginal but nonetheless positive. Its terms of trade, GDP and household consumption all improve slightly as do the poverty indicators. These results are driven largely by the assumption that direct payments in the EU are only partially decoupled and encourage a higher level of agricultural production than in the absence of the CAP. Note that the database employed implies a rather high degree of coupling of direct payments to production and thus the simulated effects of the CAP elimination are at the high end of what can be expected. The removal of border measures turns out to have a smaller impact and partly in an offsetting direction.

To derive these results we had to make a number of assumptions about the presumed behaviour of firms, households and the government in Uganda which could, no doubt, be improved in further work. A challenge facing all research on the poverty impact of trade reform (though mostly overlooked in the literature to date) is to keep separate the poverty impact of the trade reform itself from the poverty impact of the measures the government has to take to maintain equilibrium and the modelling choices for the savings and investment and the foreign account balances. In the results of the full CAP elimination, however, government spending and real investment increase while foreign savings are constant. Thus, these indicate potentially positive welfare in addition to the poverty reduction.

Another limitation of our results is that we cannot take proper account of the imperfect price transmission of price changes not just across the Uganda border (international to Uganda transmission) but, more importantly, within Uganda. The Armington structure in the Uganda CGE model determining the demand for imports does imply that changes in border prices are only imperfectly transmitted to domestic prices, but within Uganda we assume that all households, independent of their location or whether urban or rural, experience the same price effects. In reality, factors and goods are susceptible to frictions

in relocating spatially (depending, e.g., on geography and infrastructure) and thus prices as well as their changes differ across Uganda's area as shown, e.g., in Boysen (2009). Together with the strength of price signals transmitted, the induced reactions and welfare implications may vary widely between households in different locations. As a result, we over-estimate the likely reallocation of resources within Uganda in response to CAP reform. Because greater mobility of factors and goods help a specific household to better cope with an adverse price shock but restricts the extent to which it can benefit from a positive price shock, the effect on the overall welfare and poverty results of this assumption is ambiguous.

However, our study is important in demonstrating the range of channels whereby CAP reform can impact on developing countries like Uganda. The effects are felt not just in the markets for agri-food commodities but also in the markets for manufactures and services. The distribution of factor incomes changes, away from labour and capital towards land. Food prices become relatively more expensive, benefiting surplus producers but hurting poor consumers. Moreover, preference erosion adds a negative effect to the overall consequences for developing countries. In the Ugandan case, it appears that the CAP as it existed in the late 2000s had some minor impact in lowering consumption and increasing poverty, but we stress that the magnitude of these effects was very small. Further changes since then (the rise in global food prices since 2007 which has further lowered the effective protection given to EU farmers, and the additional conditionality attached to direct payments in the 2013 CAP reform and the continued reduction in their real value) make this impact smaller still.

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